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CIA HISTORICAL REVIEW PROGRAM
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1998

CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
Office of Strategic Research

CONTRIBUTION TO E 11-1-69:
THE SOVIET SPACE PROGRAM

EXPENDITURE IMPLICATIONS OF
SOVIET SPACE PROGRAMS

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Copy No. 74

April 1969

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Expenditure Implications of Soviet Space Programs

Summary

Soviet space expenditures grew rapidly from 1961 through 1965. The trend has continued upward since then, but at a slower rate due largely to the tapering off of spending associated with manned spacecraft programs and attendant support activities, including the development of large boosters. Even so, early indications are that the expenditures for 1969 could approach \$7 billion.*

Many of the resources required by the space effort are of the same type required for strategic military programs and for economic growth. Because of this, it seems unlikely that space expenditure levels during the next few years will be appreciably

** Direct information on actual Soviet expenditures for space is not available. The estimates reflect the costs of known and estimated Soviet programs as though they had been incurred in the United States. The cost estimates are intended to convey an appreciation of the approximate size of Soviet space programs measured in financial terms.*

Estimated costs of the Soviet space program in this contribution differ from those contained in the OSR contribution to the Memorandum to Holders of NIE 11-1-67. Annual expenditures since 1966 are now estimated at somewhat higher levels, for the most part due to the stepped-up activities in certain Soviet space programs, including development of a new spacecraft, over the past year.

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higher than present levels. On the other hand, the vigorous pace of activity in 1968 and 1969 suggests that the high priority of the space effort has not been reduced. Consequently, expenditures probably will not fall below their present level.

Civil programs* continue to account for most of the space expenditures, rising from just over \$600 million in 1961 to about \$5 billion in 1968. The manned lunar landing program is the most expensive. Its cumulative costs--including development of the very large booster, the spacecraft, and other hardware--are expected to total over \$20 billion when they terminate in 1973. The civil share of funding for space stations will total about \$3 billion on the completion of current programs in 1977.

Expenditures for military space programs have increased as a share of the total, reaching almost \$1.2 billion or about one-fifth of all space outlays in 1968. The reconnaissance satellite program continues to account for the largest share of costs

** The distinction between civil and military space programs was arrived at by using the US institutional framework as a model. Soviet programs that compare to US programs funded by NASA have been placed in the civil account. Those that compare to US space projects funded by the Department of Defense have been placed in the military account. Other Soviet programs, such as space stations, have a less clear primary intent, and costs for these projects have been divided equally between the two accounts. While this approach permits gross comparisons between US and Soviet data so constructed, it probably is not the way the Soviets view their space costs.*

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in the military category, representing over 40 percent of military space spending in 1968.

Soviet expenditures for cooperation in international space projects have been insignificant to date. Unless the restrictive security policy of the USSR is eased--and we think this unlikely--funds allocated for international cooperative space ventures are not expected to increase appreciably.

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Table 1
Estimated Expenditures for Soviet Space Programs a/
Through 1969

| | Billion 1966 US Dollars | | | | | | | | | |
|----------|-------------------------|------|------|------|------|------|------|------|------|---------------------|
| | Through 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 (projected) |
| Civil | 1.92 | 0.62 | 1.06 | 1.64 | 2.66 | 3.84 | 4.66 | 5.18 | 5.20 | 5.20 |
| Military | 0.10 | 0.22 | 0.31 | 0.37 | 0.48 | 0.64 | 0.81 | 0.96 | 1.18 | 1.56 |
| Total | 2.02 | 0.84 | 1.36 | 2.00 | 3.13 | 4.49 | 5.47 | 6.14 | 6.38 | 6.76 |

a. The data in this table reflect the costs of known and estimated Soviet programs as though they had been incurred in the United States and are intended to convey an appreciation of the approximate size of the effort in financial terms. Because of rounding, components may not add to totals shown.

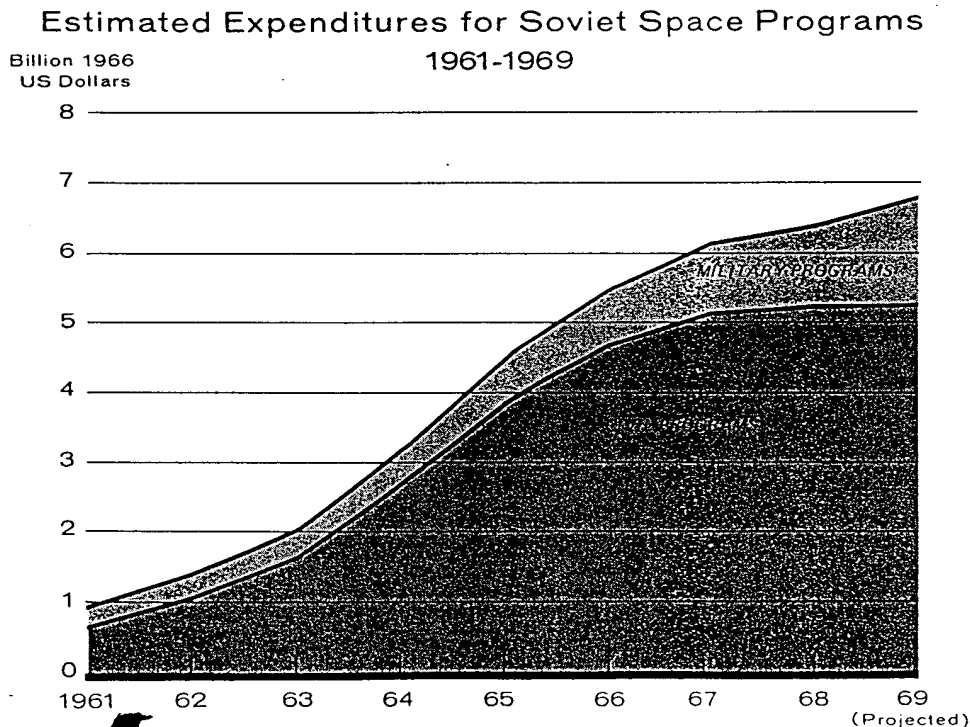
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I. Soviet Space Expenditures to Date

Up to 1961, Soviet space programs were a minor claimant of total national resources. From the early 1950s through 1960 the total cumulative spending amounted to only \$2 billion. But by 1961 the space program was becoming more diversified, and outlays in that year amounted to more than \$800 million (see Table 1, opposite page). Physics and astronomy projects and lunar and planetary probes were expanding. Manned programs, starting with the Vostok/Voskhod series, were requiring even higher annual outlays than unmanned programs, and funding for the reconnaissance satellite program had started.

As these programs progressed, expenditures rose sharply (see the chart below). From 1961 through 1965, outlays climbed by an average of over \$900 million a year, reaching a level of \$4.5 billion in 1965.



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Estimated Expenditures for Major Items in
The Soviet Space Program a/

| Major Items | Cumulative Expenditures Projected Through 1969 (Million 1966 US \$) | Expected Completion of Funding | Total Expenditures to Completion (Million 1966 US \$) |
|----------------------------|---|-----------------------------------|---|
| <u>Civil</u> | | | |
| SL-9/SL-12 | 2,100 | 1968 | 2,100 |
| Soyuz | 605 | 1969 | 605 |
| Circumlunar | 850 | 1969 | 850 |
| Very large booster | 3,690 | 1970 | 4,100 |
| New spacecraft | 2,900 | 1970 | 3,000 |
| Manned lunar landing b/ | 3,830 | 1973 | 6,660 |
| Large hydrogen upper stage | 620 | 1974 | 1,450 |
| Nuclear upper stage | 20 | 1978 | 2,300 |
| Physics and astronomy | 1,750 | Continuing | Continuing |
| Lunar/planetary | 2,295 | Continuing | Continuing |
| Meteorological | 995 | Continuing | Continuing |
| Engine improvements | 1,105 | Continuing | Continuing |
| <u>Military</u> | | | |
| Inspector/rescue | 150 | 1976 | 1,300 |
| Early warning | 105 | 1976 | 1,000 |
| Reconnaissance | 3,175 | Continuing | Continuing |
| Navigation | 305 | Continuing | Continuing |
| <u>Civil/Military</u> | | | |
| Large space station | 1,000 | 1971 | 1,330 |
| Very large space station | 390 | 1977 | 5,015 |
| Communications | 710 | Continuing | Continuing |
| Advanced research | 2,620 | Continuing | Continuing |
| Construction | 645 | Continuing | Continuing |
| Administration | 4,520 | Continuing | Continuing |

a. The data in this table reflect the costs of known and estimated Soviet programs as though they had been incurred in the United States and are intended to convey an appreciation of the approximate size and composition of the effort in financial terms.

b. Expenditure excludes development of the very large booster, the spacecraft, and other components.

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Expenditures have continued to increase since 1965, but the growth rate has slowed down considerably. Total space spending in 1968 was probably about \$6.4 billion. In 1969, expenditures are expected to reach about \$6.8 billion. Most of the expenditures during the past three years went for the manned lunar landing program, a new spacecraft for the circumlunar program, space stations, and reconnaissance satellites. In 1968, manned programs accounted for over 30 percent of all space spending.

A. Civil Space Program

Civil programs continue to account for most of the space expenditures, rising from just over \$600 million in 1961 to about \$5 billion in 1968.

The manned lunar landing program is the most expensive. From the beginning of funding in 1964 to its anticipated end in 1973, program costs alone are expected to amount to nearly \$7 billion, and hardware development costs, an additional \$13 billion to \$14 billion, so that the entire effort will cost over \$20 billion before it is completed. (See Table 2, opposite page, for estimated expenditures for major items in the space program.) Spending for the new spacecraft associated with the circumlunar program, which is estimated to have started in 1963, will total about \$3 billion by completion in 1970. The civilian share of funding for space stations (arbitrarily set at one-half the total cost) will accumulate to about \$3 billion by 1977.

Expenditures on science and applications accounted for about one-sixth of total civil space outlays in 1968. Spending here was chiefly for physics and astronomy programs, lunar and planetary probes, and certain applications such as meteorological and communications satellites. These programs are expected to have about the same relative importance in 1969.

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Support expenditures, in which development of new large boosters is the major contributing factor, accounted for much of the growth of civil space outlays during the mid-1960s. This spending accounted for more than half of total civil expenditures in 1965. By 1968, however, little more than 40 percent of the civil costs were incurred for support items, mainly because of a tapering off in spending for the development of large boosters. This trend is expected to continue until a new generation of boosters is needed, possibly in the 1980s.

The large booster program has involved two systems, the SL-9/SL-12 and a much bigger booster, which have overlapped in their development. Accumulated costs for development of the SL-9/SL-12 are estimated at some \$2 billion from their start in 1961 to their ending in 1968. Funding for the larger booster began in 1962 and will continue into 1970 for a total cost of about \$4 billion. Final costs for this item could be higher if the program stretches out much beyond 1970.

Other support items include administration, advanced research, international projects, tracking and data acquisition, and construction. Although expenditures for these items are significant in the aggregate, no single item is of particular importance by itself.

B. Military Space Program

Spending for military space programs is becoming increasingly important. It grew from about \$220 million in 1961 to nearly \$1.2 billion in 1968, or nearly 20 percent of total space outlays. The reconnaissance satellite program continues to be the most expensive item in the account. In 1968 costs of the reconnaissance program were almost \$500 million, or more than 40 percent of all military spending. Continued growth in expenditures for reconnaissance is expected.

Manned programs are also beginning to play an important role in military space spending. The

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largest category of expenditures associated with manned programs is the military share (one-half) of the costs of space stations. Also included in total military expenditures are funds for an inspection satellite program beginning in 1968 and ending in 1976, with an overall cost of about \$1.3 billion. Spending for other applications in the military category is less substantial, amounting to only about 10 percent of the military total in 1968. Spending for support programs accounted for nearly 30 percent of total military space expenditures in 1968.

II. Future Soviet Space Expenditures

Although any projection of the level of Soviet expenditures for space is subject to a fairly wide range of uncertainty, spending levels over the next few years are not expected to be significantly different from the present level. Space programs require many of the same type of high quality resources as are required for strategic military programs and for economic growth. Because of the relative scarcity of such resources in the USSR, it seems unlikely that expenditures for Soviet space programs will be appreciably higher during the next few years than they now are, with an upper level by 1973 of no more than about \$9 billion.

The vigorous pace of activity in 1968 and so far in 1969, however, suggests that the high priority of the space effort has not been reduced. Consequently, annual spending by 1973 will probably not fall below the present level of almost \$7 billion. The current successes of the US in space would also seem to be a motivation for continued heavy Soviet space expenditures, even if there is no direct race for specific accomplishments between the two countries.

III. International Space Cooperation

The USSR has shown an increased willingness in recent years to cooperate with the US and other nations on some space projects, but the impact of these ventures on Soviet space expenditures has been

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insignificant. The estimate of Soviet space expenditures to date contains a token allowance of about \$10 million a year for Soviet participation in international space ventures.

The technical data that could be acquired through extensive cooperation with the West would be useful in Soviet space and scientific efforts. The secretive policy of the USSR, however, is expected to continue to limit cooperation to areas where there is obvious gain to the Soviet Union without the disclosure of technological strength, weakness, or accomplishment that could reveal Soviet military capability.

The few space agreements which the Soviets have entered into have paid off well by providing useful data that they could not otherwise obtain because of technical or geographic limitations, with little cost or risk of exposure. In the agreement with the US to exchange satellite weather data, for example, the Soviets receive much more than they give.

The USSR's decision to attend the Intelsat conference in February 1969 may have indicated a recognition that Intersputnik cannot compete with the Intelsat Consortium and suggests that the Soviets may be interested in some form of cooperation in international communication efforts.

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